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THEOLOGICO-GEOLOGY,

OR

THE TEACHINGS OF SCRIPTURE

ILLUSTRATED BY THE

CONFORMATION

OF

THE EARTH'S CRUST,

AN

ADDRESS

Delivered before the Bible Class connected with the

Methodist Episcopal Church

ANN ARBOR, MICHIGAN,

BY

A. WINCHELL,
Professor of Natural History in the University.

ANN ARBOR,
PRINTED BY DAVIS & COLE.
1857.

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ADDRESS.

I cheerfully comply with the invitation of the Bible Class to address them on some subject connected with a proper understanding of the Sacred Scriptures, because it affords me an opportunity to strike a blow at that jealousy which has so often arrayed the friends of science and of revelation in opposition to each other. It will enable me also to dilate somewhat upon certain topics which could barely be glanced at in the brief hour that we are weekly together. It furnishes me moreover with the occasion, which seldom presents itself, of publicly enforcing the teachings of the Holy Scriptures; of urging the claims of Natural Science upon the Bible student; and of setting forth, in a familiar way, some points of the close connexion existing between the revealed will of God and the manifestations of it exhibited in some of the works of Creation; and, though I cannot within the present hour, pursue but a single one of the various trains of reflection which suggest themselves, I trust you will be able to detect in it some food for future contemplation; and that you will be stimulated to a closer study of the character of that Being "who plants his footsteps in the sea and rides upon the storm," and who preaches to us daily and hourly in "fire and hail, snow and vapor, and stormy wind, fulfilling his word,"

The entire scope of man's lawful occupations may be comprised in few words,—to acquaint himself with all the obligations which God has imposed upon him, and employ all his capabilities in their faithful discharge. Many of the obligations of men are indeed special and peculiar to themselves; but there are certain great principles of moral and religious obligation, which apply to all men in common;

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and it becomes us to employ every means in our power for arriving at a correct and complete understanding of the general moral relations in which we are placed, and of the common duties which grow out of these relations.

On these all important questions, the Holy Bible is undeniably the great text book and chart and statute book of fallen man. Its authority is original; its teachings are direct and not by inference; it was inspired for man and is addressed to man; it covers the whole ground of man's moral requirements, and it comes to us authenticated by all the evidences which the most exacting incredulity could reasonably demand. On all questions connected with man's moral relations the Holy Bible is our first and final authority. The man of piety reverences his Bible next only to his God. He feels that its pages reveal to him the only sovereign remedy for the maladies of his soul—he sees the condition of the world without its saving and sanctifying influence—he notices the imbecility of the most gifted intellects, groping and struggling alone for light in the midst of moral darkness, and turns with gratitude and worship toward that God who has alloted him a birthplace in the midst of Christian associations, and whose spirit has led him into "the better way."

But has God made himself known to man through no other medium than a direct revelation? Are there no other products of the Almighty Mind from which we can gather some *illustrations* and *corroborations* of the revealed Word? We reply there are many. The soul of man itself, the offspring of all creative energy, carries *within* us the evidence of our responsibility, and, if I mistake not, some feeble intimations of our immortality. The whole material world *without*, is everywhere replete with teachings consonant with the Word of God. Nature and Natural Religion—what are they? Nature is the material product of the same Mind which inspired the Sacred Word. In revelation we listen to the Creator *speaking*—in nature we behold him *acting*. Do we hear him declare himself a Being of immutability? In nature we behold him proceeding through endless ages according to changeless plans. Does he declare himself to us a Being of goodness? What is more palpably impressed upon the face of nature, than traces of the bene-

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science which has influenced all the counsels of the Creator? Do the Scriptures declare him a God of justice? Rewards and punishments are also an essential feature in the ordinations of the material world. Do the Scriptures attribute to God all power in Heaven and Earth? Look at the starry host, look at this fabric of a world on which we ride through space at the rate of more than a thousand miles in a minute! Nature—is itself a revelation of God in another form. Can we learn nothing from the interpretation of the *acts* of Deity? Obviously, there is much to learn from this source; and *this* is Natural Religion. Man errs, however, when he makes Natural Religion take the place of the Scriptures. He errs equally, when he closes his eyes to the light of Nature, and arrays his peculiar interpretations of Scripture against the obvious meaning elsewhere expressed.

But it needs no argument to convince you that the character of God can be read in his works. You daily witness the fact. You *must* recognize it. Does he not send his rain upon the growing crops and distribute the gentle showers of summer in such a manner that vegetation is adequately watered without producing great and devastating inundations? Are not the soft breezes which fan us under the sultry sun, grateful? And is not the cool water refreshing and agreeable? And do you not *feel* that these things were *designed* for the enjoyment and happiness of man? You eat a luscious peach, and while its deliciousness is melting on your tongue have you not reflected that this also is a special provision for man's nutrition and enjoyment? The delicious pulp is no essential part of the peach, or the cherry, or the apple. These are only accessories. These fruits, so far as the vegetable is concerned, are designed merely for the continuance of the species. This end might have been attained exactly as well by causing the seed of the peach, the cherry or the apple to grow upon its stem without the delicious pulp surrounding it. Or the pulp might have been made bitter or unwholesome. But this was not the purpose of the Creator, who *superadded* to the functional completeness of these fruits, something which is capable of nothing else but adding to the enjoyments of the human family. In the tempest you have witnessed the *power* of God.

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You have trembled in the conscious presence of a Being whose omnipotence you felt could annihilate you in an instant. And you have unconsciously recognized the *unchangeableness* of that Being to whose soil you have committed your seeds, and whose rain and sunshine you believed would cause your crops to grow in the future as they have done in the past.

In such a manner, I say, you have all recognized nature as conveying to us intimations of the spirit and design of that Being who rules in nature. In so far you have admitted that the teachings of nature tally with divine revelation.

But these are indications which lie upon the surface and are patent to every person's observation and experience. You witness them, and you recognize them, almost unconsciously; yet none the less are they the teachings of nature. But do you not suppose that by observing nature more closely, many other facts might be brought to light, which would be equally pertinent and forcible as illustrations of the Divine word? "Most assuredly," you reply—"the plans and purposes of Deity must run throughout the entire creation, and be equally intelligible in those parts which are hidden from ordinary observation and those which are open to our daily inspection." But when we penetrate beneath the surface of nature, and bring forth revelations of things not seen by common eyes, men call this "science," and say that science opposes the Bible. Oh, folly amazing—irreverent and blind! Could you see as the pious student of nature sees, you would save yourself the reproach of calling science the foe of revelation.

Science—what is it? It is *knowledge.* Knowledge of what? Is it not a knowledge of what God has ordained to exist. And how can we know a fact in nature to be different from what it is? If we know it differently from what God has made it, our science is no science. If we know it as God has made it, that is *true science.* And can that lead the heart away from the truth and from God? When you have seen a hundred instances of the power, wisdom and goodness of the Creator, where you now see one, will you be made thereby a more wicked man? You *may* be more wicked I admit, but it is palpable that the tendency of your

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knowledge would be the other way. Oh, much abused and calumniated science! best friend of the bible and of the christian religion! When will men learn that the tracing of the foot-prints of the Creator does not lead the student away from God? When will it be admitted and felt that he who has penetrated deepest into the recesses of nature, feels himself most sensibly in the presence of almighty power, and most strongly moved to gratitude and worship? Of undevout philosophers I have little to say. They are hard to be accounted for. But we know that some men turn blessings into curses. They may gormandize upon the wholesome and delicious fruits of the earth until their health is ruined, not by use, but by abuse. They may apply the genial fire which warms us, to their neighbor's dwelling or store. They may cherish a morbid excitement of some of the better sentiments of human nature, as that of philanthropy, until they become virtually monomaniacs, and curse themselves and society by the wild excesses of a humane and christian sentiment. They may even garble passages of scripture until the Bible is made to inculcate the most heinous of vices. And in like manner it is *possible* for a truly scientific person to be undevout. It is undoubtedly within the power of human audacity to penetrate into the presence of Deity, and there blaspheme. Such men we pity as we do the murderer, the incendiary or the monomaniac. But will any one have the impiety to assert that a knowledge of God's truth can cause any man to deny the existence and power of God? Depravity, prejudice, stubbornness, worldly interest may cause this; but most obviously, the tendency and teaching and spirit of true science are utterly at war with such a course. We may be irreligious in *spite* of our science, but not in *consequence* of it.

If science is God's truth, shall we fear to listen to its teachings? Do we distrust God, and fear that he has betrayed himself somewhere in creation, so that we may find somewhere, truth which will undermine our hopes of salvation? By your faith in his revealed word, distrust him not. Is God a man that he should repent, or change, or deceive? Are his purposes different then as a Creator from what they are as a Revelator? If we accept the Bible we *must*

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believe that God's purposes to man, wherever and however intimated, will prove the same. If he is unchangeable and true it is impossible that anything in nature rightly understood, can conflict with anything in revelation rightly understood. Let us accept science then as we ought—the complement of revelation—the commentary on revelation written by God himself.

It is our purpose to illustrate these general remarks by reference to some of the facts which science has brought to light, and the manner in which these facts corroborate the Divine Word, and point the candid inquirer on the way to heaven.

Does the name of science in the sacred desk outrage you? Will the array of facts which science has furnished to our hands, desecrate this hallowed place in your eyes, or ill befit the services of this hallowed day? I pray you throw your prejudice aside, and learn to consider nothing of the Creator's handiwork profane.—Behold how we may find "sermons in stones, books in the running brooks, and God in everything."

To what portion of the conquests of science we shall turn our attention, to be able to witness most readily, the close correspondence existing between nature and revelation, is a question which must be decided almost at random. All of the sciences, and especially all of the *natural sciences*, lead us into the midst of the operations of almighty power and wisdom; but perhaps one of the subjects best adapted to *popular elucidation* is the *formation and constitution of the earth's crust, considered in reference to its adaptation to the requirements of the human family.*

In the brief survey which we propose to take of this field, we expect to establish the following proposition. *The progressive development of the existing order of things has proceeded, under divine guidance, from the most remote periods,* ACCORDING TO A PLAN FIXED FROM THE BEGINNING, *and having a constant reference to the wants of those immortal natures to whom the earth has been given as a dwelling place.*

Now, my friends, to be able to appreciate the views to be presented, we must place ourselves at a scientific stand-point. We must divest our minds of prejudice and the bias of pre-conceived

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notions. We must pronounce nothing absurd or impossible, simply from the manner in which it first strikes our imaginations. The part of discretion is, to accept the obvious deductions of science, when they have received the general assent of those who have spent their lives in the express business of testing their soundness.

One of the great problems which science has proposed to solve, is that of the age and physical history of the earth upon which we dwell. And, in the light of science, how are we to look upon this terrestrial habitation? Here are mountains and valleys, majestic rivers and noisy brooks; here are forests deep and silent as the night, and smiling, sunny fields; here are plains and deserts and seas, and unfathomed ocean depths. Have these all existed under their present aspects from all eternity? Or were they all brought at once into existence, about six thousand years ago? To both of these questions science replies in the negative. These mountains and valleys, and plains and ocean-beds have been slowly and progressively elaborated—worked out, as it were, from the rough and chaotic materials which existed in the beginning—at one time submitted to the action of fire—at another, to that of water—at another, left through long ages to the slow action of time—at each successive stage of development, showing a closer approximation to the present condition of things, and a further working out of the great plan, which we see announced in the first act of the world's drama.

To become impressed with the truth and importance of these observations, we must enter a little into detail. And in doing this, it behooves us to proceed thoughtfully and reverently, as entering the house of God. If science unlocks the door to the great laboratory of the Almighty, let us not rush in thoughtlessly and profanely. When she shows us his finger-mark or his foot-print, let us remember that he is near to us. And when we are permitted to recognize the purposes which actuate him—to read, as it were, the programme of his operations through all time, let us be grateful for his indulgence, and the gift of those exalted powers which enable us to come in such close and intelligent communion

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with his spirit, and let us consecrate them to those noble and holy purposes for which he has vouchsafed them to us. For we are ourselves but his creatures—parts only of his common creation; and how consummate the folly to set ourselves up as *independent beings*, and pass judgments upon the operations or the dealings of that Almighty power, to whose benevolence we owe our existence, and to whose clemency we are daily indebted for shelter from the penalties of sin!

Let us now cast our eyes back upon the past. The history of our earth extends back many thousands, probably millions of years. The introduction of man upon its surface is one of the very last events; and though one which transpired six thousand years ago, is yet, geologically speaking, exceedingly recent—insomuch that all which has transpired *since* that event, sinks into insignificance in comparison with the monuments of the earth's *earlier* history. All the indications of science lead us to the following account of the physical history of our earth.

The matter of which the earth and material things are composed, must have come into existence through some supernatural agency—some effort of almighty power. After the lapse of an unknown interval of time subsequent to the creation of matter, we find the earth existing as a great globe of melted materials, in an incandescent state. No mountains, no seas, no water, no atmosphere, no life—everything was fused in one common, glowing mass. In this state of things, water could exist only as invisible vapor. The same would be true of mercury, tin, antimony, arsenic, and many other substances. Surrounding the ignited mass, therefore, was a mixed and heterogeneous atmosphere, made up of everything which is volatile at such a degree of heat. Is this the germ of our earth? And shall we see announced from this starting point, the plan upon which the course of development is to proceed for millions of ages through time yet future? Let us look to the facts.

A period would arrive, in the gradual cooling of the earth, when most mineral substances on its surface would have assumed their proper state of solidity or fluidity. A *crust* would form upon the surface of the molten materials, which would at first be too hot to

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allow water to rest upon it; and, as the regions of space around the earth would necessarily be cooler than the earth's surface, clouds might begin to form. By degrees they would thicken. The light of the sun would be shut out, and gloom would enshroud the infant earth.

Up to this time, it will be remembered, the entire body of waters *now* upon the earth would be kept, by the high temperature, suspended in the air. But the period has now arrived when rain begins to descend. Every drop, as it srrikes the highly heated crust, hisses and re-mounts as vapor to the upper regions. But the movement of descending rain and ascending vapor, disturbs the electricity of the elements, and lightnings flash and thunders peal in every direction. Thus, for an unknown period, perhaps for a thousand years, a tempest of thunder, lightning, wind and rain, raged fearfully and incessantly over the preparing abode of mortal man.

But now, through the continued refrigeration of the earth's crust, a temperature is reached, at which the waters are suffered to lie in one broad mass, outspreading over the earth's entire surface. ("And God made the firmament, and divided the waters which were under the firmament, from the waters which were above the firmament.") Now approaches a catastrophe of a different character from any which has preceded. You will please mark, now, carefully, the unexpected—the terrific manner in which the inequalities of the surface began to develope—in which the foundations of the nascent mountains were laid. By the laws of cooling, a body at a high temperature contracts more rapidly for the same amount of cooling, than a body at a lower temperature. In consequence of this, the gradual, though perhaps equal cooling of the crust of the earth and the melted mass within, would cause that mass to shrink away from the crust. The pressure of the superincumbent waters, together with its own weight, would cause the crust to collapse and break in all its parts. Behold now, the ruin and desolation which follow this event. Pen cannot depict—imagination cannot conceive the terrible grandeur of this scene, which only God and the angels were present to witness. The

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breaking up of the crust preciptiates the accumulated waters into the abyss of fire beneath. Quick as the flash of powder, the newly created steam bursts forth. Fragments of the shivered crust, mountain large, are hurled into the air, and, returning, plunge into the seething and boiling abysm—some to melt away, and others to drift upon the surface. The entire sea retreats again to the atmosphere, and again succeed rains, and thunders, and lightnings, as before. Such is the power of the Almighty, in whose hands worlds are playthings, while the elements execute his will.

To the eye of man, such a convulsion would appear as a retrograde movement, but omnipotence makes it an essential step in the preparation of the earth's surface for the reception of man. But it is still long ages before man's introduction upon it. The fragments resulting from the late convulsions are floating upon the molten surface. By the action of the currents, they are drifted about and accumulated in masses. Here and there, their huge and rugged forms tower above the desolate plain, like icebergs in an arctic sea.

Eventually a new crust forms, incorporating into itself the fragments of the last disruption; as the frost of a winter's night cements togather the ice-fragments of the swollen stream. Again the ocean covers the surface, but not completely. The wild ruin of the last catastrophe has laid the foundations of the mountains, which are now seen here and there, thrusting their granite peaks above the wide waste of waters.* Barren, desolate, silent rocks, on which no voice of bird or beast has yet been heard, and on which no living thing of ,animal or vegetable growth has yet found a habitation. But yet islands they are, and the mode of their formation has been the announcement of a method, which we shall see pursued, even down to the present day. Would you look upon one of those ancient, bald, and venerable summits? Go to Mt. Katahdin in Maine—go the Adirondacks in New York, go to the Iron Mountain in Missouri. Gaze upon them with reverence. Salute them as the prophets of unfolding preparations—

*These belong to the system of "igneous," "Plutonic," or "crystaline" rocks of geologists.

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grown ancient and gray in looking down upon the procession of events through the long march of ages.

By the operation of the same laws of refrigeration as before, the time would eventually arrive, when another disruption of the crust would occur. Another scene of confusion and tumult would follow. The fragments of the crust would, for the most part, enter into new arrangements; though a few solitary pinnacles seem to have withstood the storm and have survived to the present day. Upon the subsidence of the agitated surface, new mountain summits would be seen, and some of the old would be somewhat more elevated. Again the rains would descend—the ocean would accumulate—torrents of water would continually rush down the hill and mountain sides, carrying disintegrated particles of the rocks into the sea, and forming strata of sediment in the ocean's bed. Small fragments would be borne along into the sea, and by the continued lashing of its waters, these fragments would become rounded into pebbles, and these would be incorporated with the finer materials deposited upon the ocean's bed. By some agency—perhaps the pressure of the superincumbent mass of waters—perhaps the heat of the central fires—perhaps the cementing action of the substances held in solution in sea-water, or perhaps by all these and other agencies combined, the strata of sediment formed in the ocean's bed became solidified. Now came into existence a new order of rocks—those having a stratified arrangement. *

The progress of refrigeration would cause the materials of the earth to continue to shrink; and as a consequence, at remote intervals, the crust would be to some extent broken up—the ridges of pre-existing mountains would be more upheaved—the strata in the ocean's bed would be tilted up, so as to exhibit various degrees of inclination; and at each upheaval, the boundaries of dry land would be enlarged, while those of the sea would be proportionally restricted. ("Who shut up the sea with doors when it brake forth * * * and brake up for it my decreed place, and set bars and doors, and said, Hitherto shalt thou come but no fur-

*Those stratified rocks formed before the creation of animals and plants, belong to the "azoic" system of geologists.

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ther, and here shall thy proud waves be staid?") During the intervals of repose, strata of sedimentary materials formed in the bed of the ocean, with their thin edges resting upon the sloping flanks of previously upturned strata. The course of deposition and upheaval would, therefore, produce the diversity of inclination seen in the arrangements of the stratified rocks.

After the recurrence of an unknown number of upheavals, the surface of the earth became sufficiently quiet and attempered during the intervals, to allow the introduction of vegetable life.* The first plants were aquatic, and were endowed with those simple natures best suited to draw their nourishment from such materials as this rude and early condition of the earth presented. Do you ask how we *know* that vegetation appeared before animals? We reply, because the remains of vegetables are found in those deeper strata which were produced in these early times, while the remains of animals, which are much more imperishable, do not occur. You will notice also, that this agrees with the Mosaic account. "And God said, Let the waters under the Heaven be gathered together unto one place, and let the dry land appear: and it was so. And God called the dry land earth; and the gathering together of the waters called he seas: and God saw that it was good. And God said. Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself upon the earth: and it was so. And the earth brought forth grass, and the herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself, after his kind: and God saw that it was good. And the evening and the morning were third day."

We have reason to believe that the mild waters of those primeval seas teemed with the lower forms of vegetable life. And what was the peculiar office of this early vegetation in the development of the present order of things? To prepare the way for the introduction of animal life. All animals subsist directly upon organic matter—either vegatable or animal in its nature. Vegetables alone can

*Examples of strata containing remains of the very earliest Flora and Fauna of our world may be witnessed in the red sandstone of Lake Superior—the "Potsdam sandstone" of the American geologists, and lying at the base of the "Silurian system."

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which covered the earth. Successive catastrophes, occurring in the cooling and shrinking of the earth, and the breaking or upheaving of the crust, successively blotted out all traces of animal existence from its surface; and, as often as this occurred, almighty power replaced them with new generations; from time to time introducing beings of higher and higher rank. Thus, as rapidly as the lower had increased sufficiently for the support of the higher, the higher were introduced. At the same time, the improving condition of the earth fitted it in succession for more highly organized beings. Thus we had in the beginning, the zoophyte or coral builder, then the "sea spider" and his kindred, then the "shell fish" with their tribes, then the true fishes; and, after land plants had flourished and multiplied, and the conditions of the land were otherwise favorable, then reptiles and birds appeared. Do you wonder how the geologist learns the order of introduction of these existences? We reply that everything has written its own history. The bones and shells of these beings are found packed between the the successive strata of the earth's crust. As we unpack these successive layers of stone, and take out their organic contents, we know to a certainty that oysters existed before birds, because we find the bones and even the tracks of birds, in the layers which lie a long distance *above* the layers containing oyster shells. There is even an intimation of this succession in the divine record: "And God said, let the waters bring forth abundantly the moving creature that hath life—and fowl that may fly above the earth in the open firmament of heaven. And God created great whales (that is, simply, great marine animals) and every living creature that moveth, which the waters brought forth abundantly after their kind—and every winged fowl after his kind; and God saw that it was good. And God blessed them, saying, "Be fruitful and multiply and fill the waters in the seas—and let fowl multiply in the earth. And the evening and the morning were the fifth day."

At this period in the process of the earth's cooling, it is obvious that the surface must have been much warmer than at present. As a consequence, the atmosphere would be more highly charged with vapors ascending from the earth. Here then were two conditions

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existing, exceedingly favorable to the luxuriant growth of land vegetation—warmth and humidity. We find the earths surface covered accordingly with the most profuse abundance of vegetable life.—Lowly herbs and magnificent trees sprung up, flourished and fell; and large tracts, on all parts of the earth, exhibited the aspect of vast tropical jungles. And what part of the plan do you imagine this feature was designed specially to fulfill? Is this luxuriant vegetation to flourish and then to decay and disappear entirely? Man is not yet upon the earth to use it; and the lower animals have no use for it. Behold the plans of omnipotence. God intended at some time in the distant future, to create a being to people the earth, who should require large quantities of vegetable material for fuel and other purposes. He foresaw that the soil would not be able at that time, to produce sufficient to meet the demands of his use and convenience. Accordingly, in this springtime of the earth's existence, when circumstances favor the rapid growth of vegetation, he produces immense crops of fuel, which he stores up for man's future use among the different layers of the rocks † And here, my friends, was the origin of those vast deposits of coal which are scattered through all countries. You will notice that they are not limited to the tropical regions, or any particular portion of the earth, but are brought to every people's threshhold; and every people is to-day, exhuming and burning the coal which Providence stored away for our use, millions of years before Adam was created.

But there is another point to which I ought now to direct your attention. I have spoken of the occasional breaking up, or simple upheaval of the earth's crust, so that the fractured edges of the rocky layers are often turned to the surface, and we are enabled to trace a thickness of successive strata, amounting, in some cases, to many miles. You will at once perceive that we are indebted to such convulsive movements for the pleasing variety of mountain, hill, plain, valley, gorge and precipice, which the surface of our earth presents. Ruinous, destructive and retrogressive as these successive catastrophes must have seemed to the eye of man, if he could have been present, I have no doubt they were the direct and essential means

†These constitute the great feature of the "Carboniferous System."

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by which Omnipotence purposed to produce the varied and agreeable scenery of our continents. And it will further be observed that this tilting of the strata and presentation of their upturned edges to our examination, is the only means by which we could ever have been admitted to the successful investigation of the earth's history. By so unexpected a means, has God placed in our reach, the material for reflection and research. By such a means, he has taken the *pains* as it were, to lay open to our view the plain records of his doings upon our earth, for the long ages prior to man's creation.—And by such means he has bidden us to investigate, and learn what he has done for man, and what *dispositions* he has manifested in the arrangements perfected for man's introduction upon the earth—for his mental and moral development—and for his attainment to a close communion and fellowship with his Creator.

By such a means has Providence not only diversified the surface of our earth with hill and vale, and unlocked the secrets of the earth's development-history, but has also thrown up within human reach, all of those metals and mineral products which enter so largely into the arts and comforts of civilized life. Had the different layers of the earth's crust remained in a horizontal position, as they were successively deposited, the riches of the mines would have been forever excluded from human penetration, if not from human knowledge. Our beds of Coal would have lain buried many thousands of feet beneath the surface. But the benevolence of God did not create these vast resources of human comfort, and then leave them at inaccessible depths beneath the surface. His plans have been *complete*, and man cannot move without involving himself in an infinite debt of gratitude to almighty care and forelight.

But, it will be remembered, that in tracing the progress of creation, as revealed in the vestiges contained in the rocks, we have not yet reached any indications of the existence of quadrupeds, or "beasts of the field," or, as naturalists style them, "*mammals*." These stand at the head of Creation, and according to the plan announced, require to be created last. Their bones are found only in the rocks of the upper portions of the earth's crust.* Prior to their

*The creation of mammals marks the advent of the "Tertiary Period."

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creation, the earth had been swept as much as fifteen or twenty times of all, or nearly all of its existing animals, and as many times repeopled with different, though kindred tribes; with the introduction at each successive creation, of some higher types of organization. Now the class of Mammals was introduced. But as yet man was not. The world must undergo a final and severe ordeal before it is fit for the occupancy of the lord of created things.

It will be observed that both nature and revelation indicate first the creation of aquatic tribes and of birds. Subsequently we find in the rocks the remains of *terrestrial* animals. What does the Mosaic account say of this succession? "And God said, Let the *earth* bring forth the living creature after his kind, cattle and creeping thing and beast of the earth after his kind; and it was so."—(On the *fifth* day he said, Let the *waters* bring forth abundantly) "And God made the beast of the earth after his kind, and cattle after their kind, and everything that creepeth upon the earth after his kind; and God saw that it was good." Tell me if we may not assert *more* than that Scripture is simply *reconcilable* with science. Does not science *substantiate* Scripture, and give new meaning and force to passages before unheeded?—Such a circumstantial correspondence of the divine record with the developments of science made so long subsequent, could only be brought about by the inspiration of him who knoweth all things from the beginning to the end.

We have now reached a most interesting and important point in tracing the history of our planet. The general aspect of nature was at this time quite similar to the present. The continents had assumed very much of their present dimensions and outlines. The great mountain axes had been marked out many ages before. Summer followed spring, and autumn and winter followed summer.—Vegetation smiled upon the landscape, feathered songsters made the air vocal with praise, the bee hummed over the plain and the beast of prey prowled in the forest. But yet in all this scene no human form appeared. It seemed to want but one more effort of creative will, and man should take his placeat the head of the kingdoms of nature, and creation should be complete. But such was not

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mals, only while he resided in their habitats. And were the whole animal creation *incapable* of domestication, like the tiger and the bear, how much would be subtracted from the comforts of human existence.

Such are a few of the illustrations which a study of the earth's crust furnishes, of the teachings and doctrines of the sacred Scriptures. It must not, by any means, be thought, that we have exhausted this part of the subject; or even done it the justice which it demands. We have simply lifted the veil and glanced in from a distance, upon some of the hidden operations and agencies of nature. To him who is permitted to enter, and hold daily and close commu- with the intelligence which discloses itself everywhere—in the little pebble or the massive precipice; the blade of grass or the all-shadowing banyan, the oyster of to-day or the petrifaction which lived a thousand generations before Adam—to him who has the the leisure and the disposition to ponder upon the meaning of those characters recorded upon the rocky pages of the earth's history, a power of conviction that is overwhelming and irresistable arises, and he feels in his inmost soul that everything around him speaks with one voice "There is a God, eternal, wise and good; bow in reverence at his shrine; tremble to offend him; defer thine own short-sighted plans, and let thy will be swallowed up in his."

How many appeals to the voice of nature do we find in the Bible itself! "But ask now the beasts and they shall teach thee, and the fowls of the air and they shall tell thee; or speak to the earth and it shall teach thee, and the fishes of the sea shall declare unto thee. Who knoweth not in all these places that the hand of the Lord hath wrought this?"

"He putteth forth his hand upon the rock; he overturneth the mountains by the roots. He cutteth out rivers among the rocks, and his eye seeth every precious thing."

"Which shaketh the earth out of her place, and the pillars thereof tremble, * * which doeth great things past finding out, yea, and wonders without number."

"Lo, these are parts of his ways; but how little a portion is heard of him! But the thunder of his power who can understand?"

When God is represented in the latter part of the book of Job, as speaking to Job from the whirlwind, we find him taking his texts, if we may so speak, from the book of nature, and directing Job's attention, almost exclusively, to the manifestations of himself in the wonders and the thunders of his demonstrations in the natural world.

Oh, that there were a truer friendship between the student of science and the student of the Bible! Would that each were always the student of both! Then should we see acknowledged the unity, the identity which exists throughout the Creator's works, whether in the construction of a world, in the organization of a bird, or in a volume of inspired instructions. Then would the infidel in vain attempt to array the deductions of science against the authority of the divine word; and no longer would the devotee of science be looked upon as the enemy of the "power of godliness." Then would the student of nature stand, a preacher of divine truth, by the side of the student of theology, each learning of the other, and each laboring, as becomes all men, to devote the means which he possesses, to the furtherence of the interests of immortal souls.

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